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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Ashish M. Sukhadia et al.

Serial No.: 10/797,673

Filed: March 10, 2004

ETHYLENE POLYMERS AND COPOLYMERS  
WITH HIGH OPTICAL OPACITY AND  
METHODS OF MAKING THE SAME

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§

Group Art Unit: 1713

Examiner: Lee, Rip A.

Atty. Docket: CPCM:0046/FLE/FAR/STA  
210048US00

Mail Stop Amendment  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

CERTIFICATE OF MAILING 37 C.F.R. 1.8	
I hereby certify that this correspondence is being transmitted by facsimile to the United States Patent and Trademark Office in accordance with 37 C.F.R. § 1.6(d), or is being transmitted via the Office electronic filing system in accordance with 37 C.F.R. § 1.6(a)(4), or is being deposited with the U.S. Postal Service with sufficient postage as First Class Mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on the date below:	
June 25, 2008	<i>Helen Tinsley</i>
Date	Helen Tinsley

07/01/2008 SSESHE1 00000039 10797673

01 FC:1454

1410.00 OP

Sir:

**PETITION TO ACCEPT UNINTENTIONALLY  
DELAYED CLAIM UNDER 35 U.S.C. §1.78(a)(3)**

Applicants have determined that the present application is entitled to a claim of benefit to an earlier filing date under 35 USC §120, but that the claim was unintentionally not made until this time. Accordingly, Applicants petition for the entry of this claim of benefit, as required by 37 C.F.R. §1.78(a)(3), based upon the following:

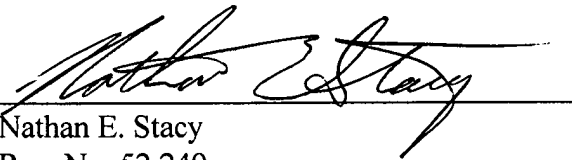
- 1) In the Amendment filed herewith, Applicants have amended the first paragraph of the specification to include a reference to each prior-filed co-pending application from which benefit of filing date is sought, referencing each such prior-filed application by application number (including series code and serial number) and indicating the relationship of the applications, as required by 37 C.F.R. §1.78(a)(2)(i), 37 C.F.R. §1.78(a)(2)(iii) and 37 C.F.R. §1.78(a)(3)(i);
- 2) This reference to the prior-filed application is being made during the pendency of the later-filed application, as required by 37 C.F.R. §1.78(a)(2)(ii);
- 3) This petition is accompanied by the required fee of \$1,370.00, as set forth in 37 C.F.R. §1.17(t); and

- 4) The entire delay in between the date that the claim was due under 37 C.F.R. § 1.78(a)(2)(ii) and the present date was unintentional.

Accordingly, Applicants request that this petition be accepted and the application be amended to include the benefit of filing date now claimed.

Respectfully submitted,

Dated: June 25, 2008

A handwritten signature in black ink, appearing to read "Nathan E. Stacy", is written over a horizontal line.

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(281) 970-4545



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ETHYLENE POLYMERS AND  
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CERTIFICATE OF TRANSMISSION OR MAILING  
37 C.F.R. 1.8

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June 25, 2008  
Date

*Helen Tinsley*  
Helen Tinsley

Sir:

**AMENDMENT AND RESPONSE TO  
OFFICE ACTION MAILED FEBRUARY 25, 2008**

In response to the Office Action mailed February 25, 2008, Applicants respectfully request reconsideration of the above-identified application in view of the amendments and remarks set forth below. Further, Applicants submit a petition under 37 C.F.R. § 1.78(a)(2) for a late claim of priority under 35 U.S.C. § 120, and request a one-month extension under 37 C.F.R. § 1.136. The Commissioner is authorized to charge the requisite fees of \$1370.00 for the petition, \$120 for the extension of time, and any additional fees which may be necessary to advance prosecution of the present application, to the credit card listed on the attached PTO-2038.

If the PTO-2038 is missing, if the amount listed thereon is insufficient, or if the amount is unable to be charged to the credit card for any other reason, the Commissioner is authorized to charge Deposit Account No. 06-1315; Order No. CPCM:0046/FLE/FAR/STA (210048US).

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02 FC:1251

120.00 DP

**AMENDMENTS TO THE SPECIFICATION**

Please add the following text as the first paragraph following the title:

**CROSS REFERENCE TO RELATED APPLICATIONS**

This application claims priority under 35 U.S.C. § 120 as a continuation-in-part of U.S. Patent Application Serial No. 10/672,785, filed September 26, 2003, which is a divisional of U.S. Patent Application Serial No. 09/639,836, filed August 16, 2000, which claims priority to U.S. Patent Application Serial No. 60/174,044, filed December 30, 1999. This application also claims priority under 35 U.S.C. § 120 as a continuation-in-part of U.S. Patent Application Serial No. 10/755,083, filed January 9, 2004.

**AMENDMENTS TO THE CLAIMS**

The following listing of the claims is provided in accordance with 37 C.F.R. §1.121.

1. (currently amended) A method of polymerizing olefins, comprising:  
contacting ethylene and at least one olefin comonomer with a catalyst composition under polymerization conditions to form a copolymer comprising less than about 10 wt. % comonomer content;  
wherein the catalyst composition comprises the contact product of at least one tightly-bridged metallocene compound, at least one organoaluminum compound, and at least one chemically-treated solid oxide;  
wherein the at least one chemically-treated solid oxide is fluorided alumina, chlorided alumina, chlorided silica-alumina, chlorided zinc-aluminum oxide, sulfated alumina, sulfated silica-alumina, bromided alumina, bromided silica-alumina, or any combination thereof;  
wherein the at least one chemically-treated solid oxide is substantially free of titanium, molybdenum, zirconium, chromium, and tungsten;  
wherein the copolymer has a polydispersity index ( $M_w/M_n$ ) less than or equal to about 20;  
wherein the copolymer has a polydispersity index ( $M_w/M_n$ ) greater than or equal to about 4;  
wherein the copolymer has a high load melt index/melt index (HLMI/MI) ratio greater than or equal to about 35; and  
wherein a 1 mil film of the copolymer has a film clarity of less than or equal to about 30%.

2. (original) The method of Claim 1, wherein the polydispersity index is less than or equal to about 12, and the film clarity is less than or equal to about 20%.

3. (original) The method of Claim 1, wherein the polydispersity index is less than or equal to about 10, and the film clarity is less than or equal to about 10%.

4. (original) The method of Claim 1, wherein the copolymer is further characterized by a density less than about  $0.930 \text{ g/cm}^3$ .

5. (original) The method of Claim 1, wherein the copolymer is further characterized by a melt index (MI) from about 0.01 to about 10 dg/min.

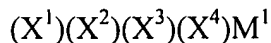
6. (original) The method of Claim 1, wherein the copolymer is further characterized by a high load melt index (HLMI) from about 8 to about 180 dg/min.

7. (original) The method of Claim 1, wherein the copolymer is further characterized by a film haze of a 1 mil film at least about 60%.

8. (original) The method of Claim 1, wherein the copolymer is further characterized by a melt strength of a 1 mil film greater than or equal to about 5.0 in.

9. (original) The method of Claim 1, wherein the copolymer is further characterized by a 1% MD Secant modulus of less than about 50,000 psi.

10. (previously presented) The method of Claim 1, wherein the at least one tightly-bridged metallocene compound is selected from a compound having the following formula:



wherein  $M^1$  is titanium, zirconium, or hafnium;

wherein  $(X^1)$  and  $(X^2)$  are independently selected from a cyclopentadienyl, an indenyl, or a fluorenyl, any one of which can be substituted or unsubstituted;

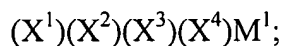
wherein (X<sup>1</sup>) and (X<sup>2</sup>) are connected by a substituted or unsubstituted bridging group comprising:

a) one atom selected from carbon, silicon, germanium, or tin, bonded to both (X<sup>1</sup>) and (X<sup>2</sup>); or

b) two contiguous carbon atoms in a chain, one end of which is bonded to (X<sup>1</sup>) and the other end of which is bonded to (X<sup>2</sup>); and

wherein (X<sup>3</sup>); (X<sup>4</sup>); each substituent on the substituted cyclopentadienyl, the substituted indenyl, and the substituted fluorenyl; and each substituent on the substituted bridging group are independently selected from a hydrocarbyl group, an aliphatic group, an aromatic group, a cyclic group, a combination of aliphatic and cyclic groups, an oxygen group, a sulfur group, a nitrogen group, a phosphorus group, an arsenic group, a carbon group, a silicon group, a germanium group, a tin group, a lead group, a boron group, an aluminum group, -SO<sub>2</sub>X, -OAlX<sub>2</sub>, -OSiX<sub>3</sub>, -OPX<sub>2</sub>, -SX, -OSO<sub>2</sub>X, -AsX<sub>2</sub>, -As(O)X<sub>2</sub>, or -PX<sub>2</sub>, wherein X is selected independently from halide, H, NH<sub>2</sub>, OR, or SR, wherein R is a hydrocarbyl, or a substituted derivative thereof, any one of which having from 1 to about 30 carbon atoms; a halide; or hydrogen.

11. (previously presented) The method of Claim 1, wherein the at least one tightly-bridged metallocene compound is selected from a compound having the following formula:



wherein M<sup>1</sup> is Zr or Hf;

wherein (X<sup>1</sup>) and (X<sup>2</sup>) are independently selected from a cyclopentadienyl, indenyl, or a fluorenyl, any one of which can be substituted or unsubstituted;

wherein (X<sup>1</sup>) and (X<sup>2</sup>) are connected by a bridging group selected from >CR<sup>1</sup><sub>2</sub>, >SiR<sup>1</sup><sub>2</sub>, or -CR<sup>1</sup><sub>2</sub>CR<sup>1</sup><sub>2</sub>-, wherein R<sup>1</sup> in each instance is independently selected from a linear, branched, substituted, or unsubstituted hydrocarbyl group, any one of which having from 1 about 30 carbon atoms; or hydrogen; and

wherein any substituent on (X<sup>1</sup>), (X<sup>2</sup>), or R<sup>1</sup> is independently selected from

hydrocarbonyl group, an oxygen group, a sulfur group, a nitrogen group, a phosphorus group, -SO<sub>2</sub>X, -OA1X<sub>2</sub>, -OSiX<sub>2</sub>, -OPX<sub>2</sub>, -SX, -OSO<sub>2</sub>X, -AsX<sub>2</sub>, -As(O)X<sub>2</sub>, or -PX<sub>2</sub>, wherein X selected independently from halide, H, NH<sub>2</sub>, OR, or SR, wherein R is a hydrocarbonyl, having from 1 to about 30 carbon atoms; a halide; or hydrogen; and

wherein (X<sup>3</sup>); (X<sup>4</sup>) are independently selected from alkoxide or aryloxy having from 1 to about 30 carbon atoms, halide, or hydride.

12. (previously presented) The method of Claim 1, wherein the at least one tightly-bridged metallocene compound is:

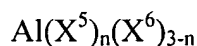
*rac*-1,2-ethanediylbis(η<sup>5</sup>-1-indenyl)dichlorozirconium;  
1,2-ethanediylbis(η<sup>5</sup>-1-indenyl)di-n-butoxyhafnium;  
1,2-ethanediylbis(η<sup>5</sup>-1-indenyl)dimethylzirconium;  
3,3 -pentanediylbis(η<sup>5</sup>-4,5,6,7-tetrahydro-1-indenyl)hafnium dichloride;  
methylphenylsilylbis(η<sup>5</sup>-4,5,6,7-tetrahydro-1-indenyl)zirconium dichloride;  
*rac*-dimethylsilylbis(1-indenyl)zirconium dichloride;  
octylphenylsilylbis(1-indenyl)hafnium dichloride;  
dimethylsilylbis(η<sup>5</sup>-4,5,6,7-tetrahydro-1-indenyl)zirconium dichloride;  
*rac*-dimethylsilylbis(2-methyl-1-indenyl)zirconium dichloride;  
1,2-ethanediylbis(9-fluorenyl)zirconium dichloride;  
methyloctylsilylbis(9-fluorenyl)zirconium dichloride;  
diphenylmethylenedicyclopentadienyl(9-fluorenyl)zirconium dichloride;  
diphenylmethylenedicyclopentadienyl(indenyl)zirconium dichloride;  
*iso*-propylidenebis(cyclopentadienyl)zirconium dichloride;  
*iso*-propylidene(cyclopentadienyl)(9-fluorenyl) zirconium dichloride;  
*iso*-propylidene(3-methylcyclopentadienyl)(9-fluorenyl)zirconium dichloride;     *meso*-ethylenebis(1-indenyl)zirconium dichloride;  
*rac*-ethylenebis(2-methyl-1-indenyl)zirconium dichloride;



*rac*-ethylenebis(4,5,6,7-tetrahydro-1-indenyl)zirconium dichloride;  
dimethylsilylbis(cyclopentadienyl)zirconium dichloride;  
dimethylsilylbis(9-fluorenyl)zirconium dichloride;  
*meso*-dimethylsilylbis(2-methylindenyl)zirconium dichloride;  
*rac*-dimethylsilylbis(tetrahydroindenyl) zirconium dichloride;  
dimethylsilylbis(tetramethylcyclopentadienyl) zirconium dichloride;  
diphenylsilyl(cyclopentadienyl)(9-fluorenyl) zirconium dichloride;  
diphenylsilylbis(indenyl) hafnium dichloride; or  
any combination thereof.

13. (previously presented) The method of Claim 1, wherein the at least one tightly-bridged metallocene compound is *rac*-1,2-ethanediylbis( $\eta^5$ -1-indenyl)dichlorozirconium, dimethylsilylbis(indenyl)zirconium dichloride, or a combination thereof.

14. (previously presented) The method of Claim 1, wherein the at least one organoaluminum compound comprises a compound with the formula:



wherein ( $\text{X}^5$ ) is a hydrocarbyl having from 1 to about 20 carbon atoms; ( $\text{X}^6$ ) is selected from alkoxide or aryloxy having from 1 to about 20 carbon atoms, halide, or hydride; and n is a number from 1 to 3, inclusive.

15. (previously presented) The method of Claim 1, wherein the at least one organoaluminum compound is trimethylaluminum (TMA), triethylaluminum (TEA), tripropylaluminum, diethylaluminum ethoxide, tributylaluminum, diisobutylaluminum hydride, triisobutylaluminum, diethylaluminum chloride, or any combination thereof.

16. (canceled)

17. (canceled)

18. (original) The method of Claim 1, wherein the contacting is conducted in the presence of a diluent comprising isobutane.

19. (previously presented) The method of Claim 1, wherein the catalyst composition further comprises the contact product of a cocatalyst selected from at least one aluminoxane, at least one organozinc compound, at least one organoboron compound, at least one ionizing ionic compound, or any combination thereof.

20. (currently amended) A method of polymerizing olefins, comprising:  
contacting ethylene and at least one olefin comonomer with a catalyst composition under polymerization conditions to form a polyethylene copolymer;

wherein the catalyst composition comprises the contact product of at least one tightly-bridged metallocene compound, at least one organoaluminum compound, and at least one chemically-treated solid oxide;

wherein the at least one chemically-treated solid oxide is fluorided alumina, chlorided alumina, chlorided silica-alumina, chlorided zinc-aluminum oxide, sulfated alumina, sulfated silica-alumina, bromided alumina, bromided silica-alumina, or any combination thereof;

wherein the at least one chemically-treated solid oxide is substantially free of titanium, molybdenum, zirconium, chromium, and tungsten;

wherein the copolymer has a film haze of a 1 mil film at least about 60%;

wherein the copolymer has a polydispersity index ( $M_w/M_n$ ) greater than or equal to about 4;

wherein the copolymer has a high load melt index/melt index (HLMI/MI) ratio greater than or equal to about 35; and

wherein the copolymer has a high load melt index (HLMI) from about 8 to about 180 dg/min.

21. (original) The method of Claim 20, wherein the film haze of a 1 mil film is at least about 70%, and high load melt index is from about 10 to about 150 dg/min.

22. (original) The method of Claim 20, wherein the film haze of a 1 mil film is at least about 70%, and the high load melt index is from about 11 to about 100 dg/min.

23. (original) The method of Claim 20, wherein the copolymer is further characterized by a polydispersity index (Mw/Mn) less than or equal to about 20.

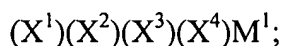
24. (original) The method of Claim 20, wherein the copolymer is further characterized by a density less than about 0.930 g/cm<sup>3</sup>.

25. (original) The method of Claim 20, wherein the copolymer is further characterized by a melt index (MI) from about 0.01 to about 10 dg/min.

26. (original) The method of Claim 20, wherein the copolymer is further characterized by a melt strength of a 1 mil film greater than or equal to about 5.0 in.

27. (original) The method of Claim 20, wherein the copolymer is further characterized by a 1% MD Secant modulus of less than about 50,000 psi.

28. (previously presented) The method of Claim 20, wherein the at least one tightly-bridged metallocene compound is selected from a compound having the following formula:



wherein M1 is titanium, zirconium, or hafnium;

wherein (X<sup>1</sup>) and (X<sup>2</sup>) are independently selected from a cyclopentadienyl, an indenyl, or a fluorenyl, any one of which can be substituted or unsubstituted;

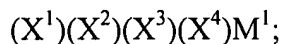
wherein (X<sup>1</sup>) and (X<sup>2</sup>) are connected by a substituted or unsubstituted bridging group comprising:

a) one atom selected from carbon, silicon, germanium, or tin, bonded to both (X<sup>1</sup>) and (X<sup>2</sup>); or

b) two contiguous carbon atoms in a chain, one end of which is bonded to (X<sup>1</sup>) and the other end of which is bonded to (X<sup>2</sup>); and

wherein (X<sup>3</sup>); (X<sup>4</sup>); each substituent on the substituted cyclopentadienyl, the substituted indenyl, and the substituted fluorenyl; and each substituent on the substituted bridging group are independently selected from a hydrocarbyl group, an aliphatic group, an aromatic group, a cyclic group, a combination of aliphatic and cyclic groups, an oxygen group, a sulfur group, a nitrogen group, a phosphorus group, an arsenic group, a carbon group, a silicon group, a germanium group, a tin group, a lead group, a boron group, an aluminum group, -SO<sub>2</sub>X, -OAlX<sub>2</sub>, -OSiX<sub>3</sub>, -OPX<sub>2</sub>, -SX, -OSO<sub>2</sub>X, -AsX<sub>2</sub>, -As(O)X<sub>2</sub>, or -PX<sub>2</sub>, wherein X is selected independently from halide, H, NH<sub>2</sub>, OR, or SR, wherein R is a hydrocarbyl, or a substituted derivative thereof, having from 1 to about 30 carbon atoms; a halide; or hydrogen.

29. (previously presented) The method of Claim 20, wherein the at least one tightly-bridged metallocene compound is selected from a compound having the following formula:



wherein M<sup>1</sup> is selected from Zr or Hf;

wherein (X<sup>1</sup>) and (X<sup>2</sup>) are independently selected from a cyclopentadienyl, an indenyl, or a fluorenyl, any one of which can be substituted or unsubstituted;

wherein (X<sup>1</sup>) and (X<sup>2</sup>) are connected by a bridging group selected from >CR<sup>1</sup><sub>2</sub>, >SiR<sup>1</sup><sub>2</sub>, or -CR<sup>1</sup><sub>2</sub>CR<sup>1</sup><sub>2</sub>-, wherein R<sup>1</sup> in each instance is independently selected from a linear, branched, substituted, or unsubstituted hydrocarbyl group, any one of which having from 1 to about 30 carbon atoms; or hydrogen; and

wherein any substituent on (X<sup>1</sup>), (X<sup>2</sup>), or R<sup>1</sup> is independently selected from a hydrocarbyl group, an oxygen group, a sulfur group, a nitrogen group, a phosphorus group, -SO<sub>2</sub>X, -OA1X<sub>2</sub>, -OSiX<sub>3</sub>, -OPX<sub>2</sub>, -SX, -OSO<sub>2</sub>X, -AsX<sub>2</sub>, -As(O)X<sub>2</sub>, or -PX<sub>2</sub>, wherein X is selected independently from halide, H, NH<sub>2</sub>, OR, or SR, wherein R is a hydrocarbyl, having from 1 to about 30 carbon atoms; a halide; or hydrogen; and

wherein (X<sup>3</sup>); (X<sup>4</sup>) are independently selected from alkoxide or aryloxide having from 1 to about 30 carbon atoms, halide, or hydride.

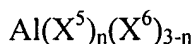
30. (previously presented) The method of Claim 20, wherein the at least one tightly-bridged metallocene compound is:

*rac* -1,2-ethanediylbis(η<sup>5</sup>-1-indenyl)dichlorozirconium;  
1,2-ethanediylbis(η<sup>5</sup>-1-indenyl)di-n-butoxyhafnium;  
1,2-ethanediylbis(η<sup>5</sup>-1-indenyl)dimethylzirconium;  
3,3 -pentanediylbis(η<sup>5</sup>-4,5,6,7-tetrahydro-1-indenyl)hafnium dichloride;  
methylphenylsilylbis(η<sup>5</sup>-4,5,6,7-tetrahydro-1-indenyl)zirconium dichloride;  
*rac*-dimethylsilylbis(1-indenyl)zirconium dichloride;  
octylphenylsilylbis(1-indenyl)hafnium dichloride;  
dimethylsilylbis(η<sup>5</sup>-4,5,6,7-tetrahydro-1-indenyl)zirconium dichloride;  
*rac*-dimethylsilylbis(2-methyl-1-indenyl)zirconium dichloride;  
1,2-ethanediylbis(9-fluorenyl)zirconium dichloride;  
methyloctylsilylbis(9-fluorenyl)zirconium dichloride;  
diphenylmethylidene(cyclopentadienyl)(9-fluorenyl)zirconium dichloride;  
diphenylmethylidene(cyclopentadienyl)(indenyl)zirconium dichloride;  
*iso*-propylidenebis(cyclopentadienyl)zirconium dichloride;  
*iso*-propylidenebis(cyclopentadienyl)(9-fluorenyl)zirconium dichloride;  
*iso*-propylidenebis(3-methylcyclopentadienyl)(9-fluorenyl)zirconium dichloride;  
*meso*-ethylenebis(1-indenyl)zirconium dichloride;  
*rac*-ethylenebis(2-methyl-1-indenyl) zirconium dichloride;

*rac*-ethylenebis(4,5,6,7-tetrahydro-1-indenyl) zirconium dichloride;  
dimethylsilylbis(cyclopentadienyl)zirconium dichloride;  
dimethylsilylbis(9-fluorenyl)zirconium dichloride;  
*meso*-dimethylsilylbis(2-methylindenyl)zirconium dichloride;  
*rac*-dimethylsilylbis(tetrahydroindenyl) zirconium dichloride;  
dimethylsilylbis(tetramethylcyclopentadienyl) zirconium dichloride;  
diphenylsilyl(cyclopentadienyl)(9-fluorenyl) zirconium dichloride;  
diphenylsilylbis(indenyl)hafnium dichloride; or  
any combination thereof.

31. (previously presented) The method of Claim 20, wherein the at least one tightly-bridged metallocene compound is *rac*-1,2-ethanediylbis( $\eta^5$ -1-indenyl)dichlorozirconium, dimethylsilylbis(indenyl)zirconium dichloride, or a combination thereof.

32. (previously presented) The method of Claim 20, wherein the at least one organoaluminum compound comprises a compound with the formula:



wherein ( $\text{X}^5$ ) is a hydrocarbyl having from 1 to about 20 carbon atoms; ( $\text{X}^6$ ) is selected from alkoxide or aryloxy having from 1 to about 20 carbon atoms, halide, or hydride; and  $n$  is a number from 1 to 3, inclusive.

33. (previously presented) The method of Claim 20, wherein the at least one organoaluminum compound is trimethylaluminum (TMA), triethylaluminum (TEA), tripropylaluminum, diethylaluminum ethoxide, tributylaluminum, diisobutylaluminum hydride, triisobutylaluminum, diethylaluminum chloride, or any combination thereof.

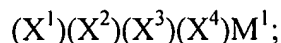
34. (canceled)

35. (canceled)

36. (original) The method of Claim 20, wherein the contacting is conducted in the presence of a diluent comprising isobutane.

37. (previously presented) The method of Claim 20, wherein the catalyst composition further comprises the contact product of a cocatalyst selected from at least one aluminoxane, at least one organozinc compound, at least one organoboron compound, at least one ionizing ionic compound, or any combination thereof.

38. (currently amended) A composition comprising the contact product of at least one tightly-bridged metallocene compound, at least one organoaluminum compound, and at least one chemically-treated solid oxide, wherein the at least one tightly-bridged metallocene compound is selected from a compound having the following formula:



wherein  $M^1$ ; is titanium, zirconium, or hafnium;

wherein  $(X^1)$  and  $(X^2)$  are independently selected from a cyclopentadienyl, an indenyl, or a fluorenyl, any one of which can be substituted or unsubstituted;

wherein  $(X^1)$  and  $(X^2)$  are connected by a substituted or unsubstituted bridging group comprising:

a) one atom selected from carbon, silicon, germanium, or tin, bonded to both  $(X^1)$  and  $(X^2)$ ; or

b) two contiguous carbon atoms in a chain, one end of which is bonded to  $(X^1)$  and the other end of which is bonded to  $(X^2)$ ; and

wherein  $(X^3)$ ;  $(X^4)$ ; each substituent on the substituted cyclopentadienyl, the substituted indenyl, and the substituted fluorenyl; and each substituent on the substituted bridging group are independently selected from a hydrocarbyl group, an aliphatic group, an aromatic group, a cyclic

group, a combination of aliphatic and cyclic groups, an oxygen a sulfur group, a nitrogen group, a phosphorus group, an arsenic group, a carbon group, a silicon group, a germanium group, a tin group, a lead group, a boron group, an aluminum group, -SO<sub>2</sub>X, -OAlX<sub>2</sub>, -OSiX<sub>3</sub>, -OPX<sub>2</sub>, -SX, -OSO<sub>2</sub>X, -AsX<sub>2</sub>, -As(O)X<sub>2</sub>, or -PX<sub>2</sub>, wherein X is selected independently from halide, H, NH<sub>2</sub>, OR, or SR, wherein R is a hydrocarbyl, or a substituted derivative thereof, having from 1 to about 30 carbon atoms; a halide; or hydrogen; and

wherein the at least one chemically-treated solid oxide is fluorided alumina, chlorided alumina, chlorided silica-alumina, chlorided zinc-aluminum oxide, sulfated alumina, sulfated silica-alumina, bromided alumina, bromided silica-alumina, or any combination thereof;

wherein the at least one chemically-treated solid oxide is substantially free of titanium, molybdenum, zirconium, chromium, and tungsten;

wherein the composition will form a copolymer when contacted with ethylene and at least one olefin comonomer,

wherein the copolymer has a comonomer content of less than about 10 wt. %;

wherein the copolymer has a polydispersity index (Mw/Mn) greater than or equal to about 4; and

wherein the copolymer has a high load melt index/melt index (HLMI/MI) ratio greater than or equal to about 35; and

with the proviso that the at least one tightly-bridged metallocene compound is not:

1,2-ethanediylbis( $\eta^5$ -1-indenyl)di-n-butoxyhafnium;

1,2-ethanediylbis( $\eta^5$ -1-indenyl)dimethylzirconium;

3,3-pentanediybis( $\eta^5$ -4,5,6,7-tetrahydro-1-indenyl)hafnium dichloride;

methylphenylsilylbis( $\eta^5$ -4,5,6,7-tetrahydro-1-indenyl)zirconium dichloride;

*rac*-dimethylsilylbis(1-indenyl)zirconium dichloride;

dimethylsilylbis( $\eta^5$ -4,5,6,7-tetrahydro-1-indenyl)zirconium dichloride;

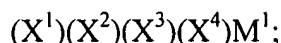
*rac*-dimethylsilylbis(2-methyl-1-indenyl) zirconium dichloride;

*rac*-1,2-ethanediylbis(2-methyl-1-indenyl) zirconium dichloride;



*rac*-1,2-ethanediylbis(1-indenyl)zirconium dichloride;  
1,2-ethanediylbis(9-fluorenyl) zirconium dichloride; or  
methyloctylsilylbis(9-fluorenyl)zirconium dichloride.

39. (previously presented) The composition of Claim 38, wherein the at least one tightly-bridged metallocene compound is selected from a compound having the following formula:



wherein  $M^1$ ; is Zr or Hf;

wherein  $(X^1)$  and  $(X^2)$  are independently selected from a cyclopentadienyl, an indenyl, or a fluorenyl, any one of which can be substituted or unsubstituted;

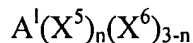
wherein  $(X^1)$  and  $(X^2)$  are connected by a bridging group selected from  $>CR^1_2$ ,  $>SiR^1_2$ , or  $-CR^1_2CR^1_2-$ , wherein  $R^1$  in each instance is independently selected from a linear, branched, substituted, or unsubstituted hydrocarbyl group, any one of which having from 1 to about 30 carbon atoms; or hydrogen; and

wherein  $(X^3)$ ;  $(X^4)$  are independently selected from alkoxide or aryloxide having from 1 to about 30 carbon atoms, halide, or hydride.

40. (canceled)

41. (canceled).

42. (previously presented) The composition of Claim 38, wherein the at least one organoaluminum compound comprises a compound with the formula:



wherein  $(X^5)$  is a hydrocarbyl having from 1 to about 20 carbon atoms;  $(X^6)$  is selected from alkoxide or aryloxide having from 1 to about 20 carbon atoms, halide, or hydride; and  $n$  is a number from 1 to 3, inclusive.

43. (previously presented) The composition of Claim 38, wherein the at least one organoaluminum compound is trimethylaluminum (TMA), triethylaluminum (TEA), tripropylaluminum, diethylaluminum ethoxide, tributylaluminum, diisobutylaluminum hydride, triisobutylaluminum, diethylaluminum chloride, or any combination thereof.

44. (canceled)

45. (canceled)

46. (currently amended) A method of polymerizing olefins, comprising:  
contacting ethylene and at least one olefin comonomer with a catalyst composition under polymerization conditions to form [[a]]an ethylene-based copolymer;

wherein the catalyst composition comprises the contact product of at least one tightly-bridged metallocene compound, at least one organoaluminum compound, and at least one chemically-treated solid oxide;

wherein the at least one chemically-treated solid oxide is fluorided alumina, chlorided zinc-aluminum oxide, sulfated alumina, or any combination thereof;

wherein the at least one chemically-treated solid oxide is substantially free of titanium, zirconium, molybdenum, tungsten, and chromium;

wherein the copolymer has a polydispersity index ( $M_w/M_n$ ) less than or equal to about 20;

wherein the copolymer has a polydispersity index ( $M_w/M_n$ ) greater than or equal to about 4;

wherein the copolymer has a high load melt index/melt index (HLMI/MI) ratio greater than or equal to about 35; and

wherein the copolymer has a film clarity of a 1 mil film less than or equal to about 30%;

with the proviso that the at least one tightly-bridged metallocene compound is not:

1,2-ethanediylbis( $\eta^5$ -1-indenyl)di-n-butoxyhafnium;  
1,2-ethanediylbis( $\eta^5$ -1-indenyl)dimethylzirconium;  
3,3-pentanediyibis( $\eta^5$ -4,5,6,7-tetrahydro-1-indenyl)hafnium dichloride;  
methylphenylsilylbis( $\eta^5$ -4,5,6,7-tetrahydro-1-indenyl)zirconium dichloride;  
*rac*-dimethylsilylbis(1-indenyl)zirconium dichloride;  
dimethylsilylbis( $\eta^5$ -4,5,6,7-tetrahydro-1-indenyl)zirconium dichloride;  
*rac*-dimethylsilylbis(2-methyl-1-indenyl) zirconium dichloride;  
1,2-ethanediylbis(9-fluorenyl) zirconium dichloride; or  
methyloctylsilylbis(9-fluorenyl)zirconium dichloride.

47. (currently amended) A method of polymerizing olefins, comprising:  
contacting ethylene and at least one olefin comonomer with a catalyst composition under  
polymerization conditions to form a copolymer, wherein the comonomer content of the  
copolymer is less than about 10 wt. %;

wherein the catalyst composition comprises the contact product of at least one tightly-  
bridged metallocene compound, at least one organoaluminum compound, and at least one  
chemically-treated solid oxide;

wherein the at least one chemically-treated solid oxide is fluorided alumina, chlorided  
zinc-aluminum oxide, sulfated alumina, or any combination thereof;

wherein the at least one chemically-treated solid oxide is substantially free of titanium,  
zirconium, molybdenum, tungsten, and chromium;

wherein the copolymer has a film haze of a 1 mil film at least about 60%; and wherein the  
copolymer has a high load melt index (HLMI) from about 8 to about 180  
dg/min;

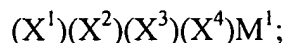
wherein the copolymer has a polydispersity index ( $M_w/M_n$ ) greater than or equal to about  
4;

wherein the copolymer has a high load melt index/melt index (HLMI/MI) ratio greater  
than or equal to about 35; and

with the proviso that the at least one tightly-bridged metallocene compound is not:

1,2-ethanediylbis( $\eta^5$ -1-indenyl)di-n-butoxyhafnium;  
1,2-ethanediylbis( $\eta^5$ -1-indenyl)dimethylzirconium;  
3,3-pentanediyibis( $\eta^5$ -4,5,6,7-tetrahydro-1-indenyl)hafnium dichloride;  
methylphenylsilylbis( $\eta^5$ -4,5,6,7-tetrahydro-1-indenyl)zirconium dichloride;  
*rac*-dimethylsilylbis(1-indenyl)zirconium dichloride;  
dimethylsilylbis( $\eta^5$ -4,5,6,7-tetrahydro-1-indenyl)zirconium dichloride;  
*rac*-dimethylsilylbis(2-methyl-1-indenyl) zirconium dichloride;  
1,2-ethanediylbis(9-fluorenyl) zirconium dichloride; or  
methyloctylsilylbis(9-fluorenyl)zirconium dichloride.

48. (currently amended) A composition comprising the contact product of at least one tightly-bridged metallocene compound, at least one organoaluminum compound, and at least one chemically-treated solid oxide, wherein the at least one tightly-bridged metallocene compound is selected from a compound having the following formula:



wherein  $M^1$  is titanium, zirconium, or hafnium;

wherein  $(X^1)$  and  $(X^2)$  are independently selected from a cyclopentadienyl, an indenyl, or a fluorenyl, any one of which can be substituted or unsubstituted;

wherein  $(X^1)$  and  $(X^2)$  are connected by a substituted or unsubstituted bridging group comprising:

a) one atom selected from carbon, silicon, germanium, or tin, bonded to both  $(X^1)$  and  $(X^2)$ ; or

b) two contiguous carbon atoms in a chain, one end of which is bonded to  $(X^1)$  and the other end of which is bonded to  $(X^2)$ ; and

wherein  $(X^3)$ ;  $(X^4)$ ; each substituent on the substituted cyclopentadienyl, the substituted indenyl, and the substituted fluorenyl; and each substituent on the substituted bridging group are independently selected from a hydrocarbyl group, an aliphatic group, an aromatic group, a cyclic

group, a combination of aliphatic and cyclic groups, an oxygen a sulfur group, a nitrogen group, a phosphorus group, an arsenic group, a carbon group, a silicon group, a germanium group, a tin group, a lead group, a boron group, an aluminum group, -SO<sub>2</sub>X, -OAlX<sub>2</sub>, -OSiX<sub>3</sub>, -OPX<sub>2</sub>, -SX, -OSO<sub>2</sub>X, -AsX<sub>2</sub>, -As(O)X<sub>2</sub>, or -PX<sub>2</sub>, wherein X is selected independently from halide, H, NH<sub>2</sub>, OR, or SR, wherein R is a hydrocarbonyl, or a substituted derivative thereof, having from 1 to about 30 carbon atoms; a halide; or hydrogen; and

wherein the at least one chemically-treated solid oxide is fluorided alumina, chlorided zinc-aluminum oxide, sulfated alumina, or any combination thereof; and

wherein the at least one chemically-treated solid oxide is substantially free of titanium, zirconium, molybdenum, tungsten, and chromium;

wherein the composition will form a copolymer when contacted with ethylene and at least one olefin comonomer;

wherein the copolymer has less than about 10 wt. % comonomer units;

wherein the copolymer has a polydispersity index (Mw/Mn) greater than or equal to about 4; and

wherein the copolymer has a high load melt index/melt index (HLMI/MI) ratio greater than or equal to about 35; and

with the proviso that the at least one tightly-bridged metallocene compound is not:

1,2-ethanediylbis(η<sup>5</sup>-1-indenyl)di-n-butoxyhafnium;

1,2-ethanediylbis(η<sup>5</sup>-1-indenyl)dimethylzirconium;

3,3-pentanediyldis(η<sup>5</sup>-4,5,6,7-tetrahydro-1-indenyl)hafnium dichloride;

methylphenylsilyldis(η<sup>5</sup>-4,5,6,7-tetrahydro-1-indenyl)zirconium dichloride;

*rac*-dimethylsilyldis(1-indenyl)zirconium dichloride;

dimethylsilyldis(η<sup>5</sup>-4,5,6,7-tetrahydro-1-indenyl)zirconium dichloride;

*rac*-dimethylsilyldis(2-methyl-1-indenyl) zirconium dichloride;

*rac*-1,2-ethanediylbis(2-methyl-1-indenyl) zirconium dichloride;

*rac*-1,2-ethanediylbis(1-indenyl)zirconium dichloride;

1,2-ethanediylbis(9-fluorenyl) zirconium dichloride; or  
methyloctylsilylbis(9-fluorenyl)zirconium dichloride.

### **REMARKS**

In the Office Action, the Examiner rejected claims 1-15, 18-33, 36-39, 42, 43, and 46-48. By this paper, Applicants have amended claims 1, 20, 38, and 46-48 to clarify certain features, and have amended the specification as shown above. These amendments do not add any new matter. Upon entry of the amendments, claims 1-15, 18-33, 36-39, 42, 43, and 46-48 remain pending in the present application. In view of the foregoing amendments and following remarks, all pending claims are believed to be in condition for allowance.

### **Amendment to Add Priority Claims under 37 C.F.R. §1.78(a)(2)**

Applicants have determined that the present application is entitled to a claim of benefit under 35 USC §120 to earlier filed applications, but that the claim was unintentionally not made until this time. Accordingly, Applicants are submitting the above amendment to the specification to add a priority claim pursuant to 37 C.F.R. §1.78(a)(2) to Hawley et al., U.S. Patent Application Serial No. 10/672,785, filed on September 26, 2003 (which issued as U.S. Patent No. 7,109,277 on September 19, 2006), which is a divisional of Hawley et al., U.S. Patent Application Serial No. 09/639,836, filed August 16, 2000 (which issued as U.S. Patent No. 6,667,274 on December 23, 2003, hereinafter “the ‘274 patent”), which claims priority to U.S. Patent Application Serial No. 60/174,044, filed December 30, 1999. Applicants have also amended the specification to claim priority to U.S. Patent Application Serial No. 10/755,083, filed on January 09, 2004 (which issued as U.S. Patent No. 7,041,617 on May 9, 2006, hereinafter “the ‘617 patent”). A petition to accept an unintentionally delayed claim, as required by 37 C.F.R. §1.78(a)(3), is enclosed with this amendment.

### **Rejections Under the First Paragraph of 35 U.S.C. § 112**

In the Office Action, the Examiner rejected claims 1-15, 18-33, 36-39, 42, 43, and 46-48 under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement.

***First Rejection Under 35 U.S.C. § 112***

With respect to the first rejection of claims 1-15, 18-33, 36-39, 42, 43, and 46-48 under 35 U.S.C. § 112, first paragraph, the Examiner stated that:

Claims recite the limitation that the chemically treated solid oxide is substantially free of zirconium and chromium. Any claims containing negative limitation which does not have basis in the original disclosure are rejected under 35 U.S.C. § 112, first paragraph for failing to comply with the written description requirement.

Office Action, p. 2. Applicants respectfully traverse this rejection.

While some older courts were critical of negative limitations, the “current view of the courts is that there is nothing inherently ambiguous or uncertain about a negative limitation.” M.P.E.P. § 2173.05(i), p. 2100-228 (8th Ed., Rev. 6, Sep. 2007). Moreover, word-for-word literal support in the specification is not required for negative claim limitations, if the specification conveys that the applicants had possession of the concept at the time of filing. *See Ex parte Parks*, 30 U.S.P.Q.2d 1234, 1236 (B.P.A.I. 1993). For example, “[i]f *alternative* elements are *positively recited* in a specification they may be explicitly *excluded* in the claims.” M.P.E.P. § 2173.05(i)(emphasis added). Indeed, it has long been held that an applicant is entitled to claim “less than the full scope of his disclosure.” *In re Johnson*, 194 U.S.P.Q. 187, 195 (C.C.P.A. 1971).

Apparently, the Examiner contended that there must be word-for-word literal support in the written description for a negative limitation in a claim. However, as indicated, word-for-word literal support in the description for a negative claim limitation is not required. *See, e.g.*, M.P.E.P. § 2173.05(i) (citing *Ex parte Parks*, 30 U.S.P.Q.2d 1234, 1236 (Bd. Pat. App. & Inter. 1993)). Indeed, as discussed above in the legal precedent section, “[i]f *alternative* elements are *positively recited* in a specification they may be explicitly *excluded* in the claims.” M.P.E.P. §



2173.05(i). In the present specification, zirconium and chromium are positively listed as alternatives and, therefore, may be expressly excluded in the claims.

Applicants respectfully note that the Examiner's reliance on *Ex Parte Grasselli* is misplaced. See Office Action, page 2. In *Ex parte Grasselli*, unlike the present case, no support existed in the written description for amendments to the claims that added negative limitations. The applicant (Grasselli) excluded elements that were not mentioned in the written description, as filed. See *Ex parte Grasselli*, 231 U.S.P.Q. 393, 393-94 (Fed. Cir. 1984). For example, Grasselli expressly excluded uranium from the claims but there was no mention (positive or negative) of uranium or related components in the specification. See *id.* For this reason, the Board upheld a rejection under Section 112, explaining that the amendment to exclude uranium introduced a new concept. *Id.* In contrast, present specification mentions both zirconium and chromium as alternative components in the solid oxide, and therefore, again it is entirely appropriate that Applicants amend the present claims to exclude these metals.

Further, Applicants respectfully note that *In re Johnson* is more applicable to the present case. In *In re Johnson*, the patent application specification at issue disclosed over fifty alternate choices that could be used for the precursor compounds. See *In re Johnson*, 194 U.S.P.Q. 187, 195 (C.C.P.A. 1971). The applicants specifically excluded two of these choices from the patent protection sought. *Id.* at 191. The court held that the applicants were entitled to limit the claims to those disclosed alternatives not covered by the prior art. *Id.* at 196 ("It is for the inventor to decide what *bounds* of protection he will seek.") (emphasis in original).

In sum, the present written description expressly lists numerous metals, including zirconium and chromium, as options that may be included in the solid oxide formulations of the claimed process. Specification, p. 28, ll. 4-6 ("Usually the solid oxide comprises oxygen and at least one element selected from Al, B, Be, Bi, Cd, Co, Cr, Cu, Fe, Ga, La, Mn, Mo, Ni, Sb, Si, Sn, Sr, Th, Ti, V, W, P, Y, Zn, or Zr." ) (emphasis added). Thus, the claim element "wherein the

at least one chemically-treated solid oxide is substantially free of titanium, molybdenum, zirconium, chromium, and tungsten" recited in claims 1, 20, 38, and 46-48 is plainly a valid exclusionary proviso that finds full support in the specification. As such, Applicants respectfully assert that claims 1, 20, 38, and 46-48, and their respective dependent claims comply with 35 U.S.C. § 112, and request that the Examiner withdraw the rejection.

***Second Rejection Under 35 U.S.C. § 112***

With respect to the second rejection of claims 1-15, 18-33, 36-39, 42, 43, and 46-48 under 35 U.S.C. § 112, first paragraph, the Examiner stated that:

Claims recite the limitation that copolymer has a polydispersity index ( $M_w/M_n$ ) of greater than or equal to about 4. The specification discloses polydispersity index of inventive polymer on page 4, line 24 ( $M_w/M_n$  less than or equal to about 20) and page 5, lines 5, 12, and 13 ( $M_w/M_n$  less than or equal to about 12, 10, and 6, respectively). While inventive polymers have specified upper bounds of polydispersity, there appears to be no teaching that polymers necessarily contain a lower limit of about 4. Notably, the specification is devoid of any indication that inventive polymers have a polydispersity within the range of about 4 to about 20, as implied in instant claim 1. In light of these considerations, it is deemed that the claimed subject matter is not described in the specification in such a way as to convey to one skilled in the art that the inventors, at the time the application was filed, has possession of the claimed invention.

Office Action, p. 3. Applicants respectfully traverse this rejection. Applicants respectfully point the Examiner to Table 6 on p. 88 of the present specification. Table 6 specifically lists a value of 4 for the polydispersity index and, thus, plainly supports the lower limit of 4 for the polydispersity index.

Regarding the written description requirement, the initial burden of proof regarding the sufficiency of the written description falls on the Examiner. Accordingly, the Examiner must present evidence or reasons why persons skilled in the art would not recognize a description of

the claimed subject matter in the applicant's disclosure. *In re Wertheim*, 191 U.S.P.Q. 90, 96 (C.C.P.A. 1976). The fundamental factual inquiry with regard to the written description requirement is whether the specification conveys with reasonable clarity to those of ordinary skill in the art that, as of the filing date sought, applicant was in possession of the claimed invention. *See, e.g., Vas-Cath, Inc. v. Mahurkar*, 19 U.S.P.Q. 2d 1111, 1117 (Fed. Cir. 1991). Furthermore, "[t]he 'written description' requirement must be applied in the context of the particular invention and the state of the knowledge." *See Capon v. Eshar*, 76 U.S.P.Q.2d 1078, 1085 (Fed. Cir. 2005).

In addition, specific examples that lie within a disclosed property range will support the narrowing of that range to encompass the examples. M.P.E.P. § 2163.05(III), p. 2100-190 (8th Ed., Rev. 6, Sep. 2007); *In re Wertheim*, 191 U.S.P.Q. at 98. As stated in *In re Wertheim*:

[I]n light of the description of the invention as employing solids content within the range of 25-60% along with specific embodiments of 36% and 50%, we are of the opinion that . . . persons skilled in the art would consider processes employing a 35-60% solids content range to be part of appellants' invention.

*Id.* Furthermore, the court held that a literal description of the range is not needed, noting that if this were true, the holding from *In re Lukach*, 169 U.S.P.Q. 795, 796 (C.C.P.A. 1971) (stating that "the invention does *not* have to be described *in ipsius verbis* in order to satisfy the description requirement of §112") would be empty verbiage. *In re Wertheim*, 191 U.S.P.Q. at 98 (emphasis added).

In this rejection, the Examiner may be contending that there must be word-for-word literal support in the written description for narrowing a range in a claim. In other words, the Examiner is apparently contending that the specification must *ipsius verbis* list the range that may be claimed. However, as discussed above, just as for negative claim limitations, word-for-word literal support in the description for narrowing a range is not required, so long as specific

examples demonstrate that the inventors had possession of the invention at the time of filing. *In re Wertheim*, 191 U.S.P.Q. at 98; M.P.E.P. 2163.05(III).

For example, in *In re Wertheim*, an initially claimed range of 25-60% was narrowed to 35-60%. *In re Wertheim*, 191 U.S.P.Q. at 98. The court held that this narrowing amendment was supported by specific examples at 36% and 50%. *Id.* In the present application, the previous amendment narrowed the initially recited range for the polydispersity of “less than or equal to about 20,” by the addition of text reciting that the polydispersity is “greater than or equal to about 4.” As *In re Wertheim*, this amendment is fully supported by the examples, which show that the inventive polymers have polydispersities of 4 to 9.98. Specification, p. 88, Table 6, Resins A-F. Thus, the inventors plainly had possession of the invention at the time of filing. Accordingly, Applicants respectfully assert that claims 1, 20, 38, and 46-48, and their respective dependent claims comply with 35 U.S.C. § 112, and request that the Examiner withdraw the rejection.

### ***Third Rejection Under 35 U.S.C. § 112***

With respect to the third rejection of independent claims 1, 20, 38, and 46-48 under 35 U.S.C. § 112, first paragraph, the Examiner stated that:

Claims recite the limitation that the copolymer has a HLMI/MI ratio of greater than or equal to about 35. The specification discloses high load melt index (HLMI) and melt index (MI) of inventive polymer on page 4, line 22 (HLMI = 8-180 dg/min, MI = 0.01-10). Polymers having a lower limit of HLMI = 8 may exhibit HLMI/MI in the range of 0.8 to 800, and polymers having an upper limit of HLMI = 180 may exhibit HLMI/MI in the range of 18-18,000. The HLMI/MI ratio for this subset of inventive polymer spans an entire range of 0.8-18,000. Even for the narrowest embodiment of the invention (HLMI = 11-100 dg/min, MI = 0.05-5; page 5, line 10), the ratio HLMI/MI lies in the range of 2.2-2000. There appears to be no teaching that inventive polymers necessarily exhibit a lower limit of about 35, as indicated in the instant claims. In light of these considerations, it is deemed that the claimed subject matter is not described in the specification in such a way as to convey to

one skilled inn [sic] the art that the inventors, at the time the application was filed, has possession of the claimed invention.

Office Action, p. 3-4. Applicants respectfully traverse this rejection.

As for the previous rejection, the Examiner has apparently contended that there must be word-for-word literal support in the written description for narrowing a range in a claim. However, as previously discussed, word-for-word literal support in the description for narrowing a range is not required, so long as specific examples demonstrate that the inventors had possession of the invention at the time of filing. *In re Wertheim*, 191 U.S.P.Q. at 98; M.P.E.P. 2163.05(III).

In the present application, all examples have an HLMI/MI ratio above 35, with the closest example having an HLMI/MI ratio of 37. Specification, p. 88, Table 6. As in the case of *In re Wertheim*, this is plainly a valid limitation that finds full support in the disclosure. Accordingly, Applicants respectfully assert that claims 1, 20, 38, and 46-48, and their respective dependent claims comply with 35 U.S.C. § 112, and request that the Examiner withdraw the rejection.

#### **Rejections Under 35 U.S.C. § 102(b) or in the Alternative 35 U.S.C. § 103**

In the Office Action, the Examiner made three rejections under 35 U.S.C. § 102(b) or in the alternative under 35 U.S.C. § 103, as detailed below. As the rejections under section 103 were made in the alternative to rejections under section 102(b), they are discussed below in conjunction with the section 102(b) rejections. More specifically, the Examiner rejected claims 1-15, 18, 20-33, 36, 38, 39, 42, 43, 46 and 47 under 35 U.S.C. § 102(b) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over McDaniel et al., U.S. Patent No. 6,300,271 (hereinafter "the '271 patent"). The Examiner also rejected claims 1-15, 18, 20-33, 36, 38, 39, 42, and 43 under 35 U.S.C. § 102(b) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over McDaniel et al., U.S. Patent No. 6,391,816 (hereinafter "the '816 patent"). Finally, the Examiner rejected claims 1-15, 18-33, 36-39, 42, 43, and 46-48 under

35 U.S.C. § 102(b) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over Collins et al., U.S. Patent No. 6,524,987 (hereinafter “the ‘987 patent”).

### ***Legal Precedent***

First, the pending claims must be given an interpretation that is reasonable and consistent with the *specification*. See *In re Prater*, 415 F.2d 1393, 1404-05, 162 U.S.P.Q. 541, 550-51 (C.C.P.A. 1969); see also *In re Morris*, 127 F.3d 1048, 1054-55, 44 U.S.P.Q.2d 1023, 1027-28 (Fed. Cir. 1997); see also M.P.E.P. §§ 608.01(o) and 2111. Indeed, the specification is “the primary basis for construing the claims.” *Phillips v. AWH Corp.*, 75 U.S.P.Q.2d 1321, 1328 (Fed. Cir. 2005) (*en banc*). One should rely *heavily* on the written description for guidance as to the meaning of the claims. See *id.* (stating that “the best indicator of claim meaning is its usage in context as understood by one of skill in the art at the time of the invention.”).

Anticipation under 35 U.S.C. § 102 can be found only if a single reference shows exactly what is claimed. *Titanium Metals Corp. v. Banner*, 778 F.2d 775, 227 U.S.P.Q. 773 (Fed. Cir. 1985). Every element of the claimed invention must be identically shown in a single reference. *In re Bond*, 910 F.2d 831, 15 U.S.P.Q.2d 1566 (Fed. Cir. 1990). Indeed, the prior art reference also must show the *identical* invention “*in as complete detail as contained in the ... claim*” to support a *prima facie* case of anticipation. *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 U.S.P.Q. 2d 1913, 1920 (Fed. Cir. 1989)(emphasis added).

Furthermore, if the Examiner relies on a theory of inherency, the extrinsic evidence must make clear that the missing descriptive matter is *necessarily* present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. *In re Robertson*, 169 F.3d 743, 49 U.S.P.Q.2d 1949 (Fed. Cir. 1999). In relying upon the legal theory of inherency, the Examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic *necessarily* flows from the teachings of the applied prior art. *Ex parte Levy*, 17 U.S.P.Q.2d 1461, 1464 (B.P.A.I. 1990). The Examiner,

in presenting the inherency argument, bears the evidentiary burden and must adequately satisfy this burden. *See id.*

Lastly, the burden of establishing a *prima facie* case of obviousness under 35 U.S.C. § 103 falls on the Examiner. *Ex parte Wolters and Kuypers*, 214 U.S.P.Q. 735 (PTO Bd. App. 1979). To establish a *prima facie* case of obviousness, the Examiner must show that the combination includes *all* of the claimed elements, and also a convincing line of reason as to why one of ordinary skill in the art would have found the claimed invention to have been obvious in light of the teachings of the references. *Ex parte Clapp*, 227 U.S.P.Q. 972 (B.P.A.I. 1985). Further, the Supreme Court has recently stated that the obviousness analysis should be explicit. *See KSR Int'l Co. v. Teleflex, Inc.*, 82 U.S.P.Q.2d 1385 (U.S. 2007) (“[R]jections based on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.”) (quoting *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)).

***The ‘271 patent does not disclose polymers having an HLMI/MI ratio greater than or equal to 35.***

In rejecting independent claims 1, 20, 38, 46, and 47 as anticipated, or in the alternative, as obvious over the ‘271 patent, the Examiner stated that the ‘271 patent:

is deficient in characterizing the resulting polymer as recited in the instant claims. However, in view of the fact that the process of preparing the polymer is substantially the same as that recited in the instant claims, a reasonable basis exists to believe that the resulting polymer exhibits substantially the same properties and characteristics.

Office Action, p.4. Applicants respectfully traverse this rejection. In contrast to the Examiner’s assertion, the ‘271 patent does teach sufficient information to compare the HLMI/MI ratio of the polymers formed by the catalysts of the ‘271 patent with the HLMI/MI ratio recited in the instant claims. Indeed, the ‘271 patent discloses both the HLMI and MI values for a number of the

polymers formed from the '271 patent catalysts, thus allowing the calculation of the HLMI/MI ratio. As listed below, in all cases, the HLMI/MI ratio taught by the '271 patent is outside of the presently-claimed range.

Independent claims 1, 20, 38, 46 and 47 recite that the claimed catalysts will provide copolymers with "a high load melt index/melt index (HLMI/MI) ratio greater than or equal to about 35." In contrast to the recited ratio, Examples 11-12 of the '271 patent provide a polymer having an HLMI/MI ratio of 21.6. The '271 patent, col. 9, ll. 60-63. Furthermore, Examples 14 A, B, and 15 of the '271 patent provide a polymer having an HLMI/MI ratio of 16.6. *Id.*, col. 19, l. 37. Examples 28-31 give a ratio of 16 and 17.9. *Id.*, col. 12, l. 49 and l. 56. Example 38 gives a ratio of 17.9. *Id.*, col. 13, l. 48. Example 39 gives an HLMI/MI ratio of 19.1. *Id.*, col. 13, l. 61. Finally, Example 40 gives a ratio of 25.7. *Id.*, col. 14, ll. 7-8. Furthermore, the '271 patent specifically notes that the disclosed catalysts "usually produce polymers with a low HLMI/MI ratio." *Id.*, col. 6, ll. 18-19.

In sum, the '271 patent does not disclose any polymers that have an HLMI/MI ratio in the recited range and, therefore, cannot anticipate nor make obvious the present claims. Accordingly, Applicants respectfully assert that independent claims 1, 20, 38, 46 and 47 and, for at least the same reasons, their respective dependent claims are neither anticipated by, nor made obvious by, the '271 patent, and request withdrawal of the rejections under 35 U.S.C. §§ 102 and 103 based on the '271 patent.

***The '816 patent does not disclose polymers having an HLMI/MI ratio greater than or equal to 35 or a polydispersity greater than or equal to 4.***

In rejecting independent claims 1, 20, and 38 as anticipated, or in the alternative, as obvious over the '816 patent, the Examiner stated that the '816 patent:

is deficient in characterizing the resulting polymer as recited in the instant claims. However, in view of the fact that the process of



preparing the polymer is substantially the same as that recited in the instant claims, a reasonable basis exists to believe that the resulting polymer exhibits substantially the same properties and characteristics.

Office Action, p. 5. However, Applicants respectfully traverse this rejection and assert that the Examiner is incorrect.

Independent claims 1, 20, and 38 recite that the claimed catalysts will provide a copolymer with “a polydispersity index (Mw/Mn) greater than or equal to about 4 . . . [and] a high load melt index/melt index (HLMI/MI) ratio greater than or equal to about 35.” In contrast, the HLMI and MI values disclosed in the ‘816 patent in all cases give an HLMI/MI ratio outside of the claimed range. Specifically, Inventive Examples 11-12 resulted in a HLMI/MI ratio of 22 and 19. The ‘816 patent, col. 18, ll. 46-47 and ll. 57-58. Furthermore, the polymers disclosed in the ‘816 patent both had a polydispersity (Mw/Mn) lower than 3 (2.5 and 2.7), outside of the claimed range. *Id.*, Table 2.

Thus, the ‘816 patent does not disclose any polymers within the recited ranges of HLMI/MI or polydispersity index, and, for this reason, cannot anticipate nor make obvious the current claims. Accordingly, Applicants respectfully assert that independent claims 1, 20, and 38 and, for at least the same reasons, their respective dependent claims are neither anticipated by, nor made obvious by, the ‘816 patent, and request withdrawal of the rejections under 35 U.S.C. §§ 102 and 103, based on the ‘816 patent.

***The ‘987 patent does not disclose polymers having an HLMI/MI ratio greater than or equal to 35.***

In rejecting independent claims 1, 20, 38, and 46-48 as anticipated, or in the alternative, as obvious over the ‘987 patent, the Examiner stated that the ‘987 patent:

is deficient in characterizing the resulting polymer as recited in the instant claims. However, in view of the fact that the process of preparing the polymer is substantially the same as that recited in the instant claims, a reasonable basis exists to believe that the resulting polymer exhibits substantially the same properties and characteristics.”

Office Action, p. 6. However, Applicants respectfully traverse this rejection and assert that this is not the case.

As recited in the present independent claims, the present system will provide a copolymer with “a high load melt index/melt index (HLMI/MI) ratio greater than or equal to about 35.” In contrast, the ‘987 patent characterizes the HLMI/MI ratio for a number of example polymers, none of which are greater than 26, much less greater than the presently-recited lower limit of 35. The ‘987 patent, col. 16, l. 64; col. 17, l. 24; l. 30; col. 18, l. 54. Thus, the ‘987 patent does not disclose any polymers in the claimed ranges and, for this reason, cannot anticipate nor make obvious the current claims.

The Examiner noted that “the examples [in the ‘987 patent] correspond only to polymer prepared from one type of catalyst.” Office Action, p. 11. However, Applicants respectfully assert that the ‘987 patent has provided no indication that other catalysts will provide higher HLMI/MI ratios, or, indeed, that such high HLMI/MI ratios are important. In the absence of such indications, or “blazemarks,” to guide one skilled in the art to make polymers having high HLMI/MI ratios, simply describing a large genus of catalysts that may or may not make such polymers is not sufficient. *See In re Ruschig*, 154 USPQ 118, 122 (C.C.P.A. 1967) (noting that in the absence of directions, simply disclosing a large class of compounds was not sufficient to make a particular species obvious). Further, the Examiner has not shown that the claimed HLMI/MI ratio “necessarily flows” from the teachings of the ‘987 patent. *Ex parte Levy*, 17 U.S.P.Q.2d at 1464. Accordingly, Applicants respectfully assert that independent claims 1, 20, 38, and 46-48 and, for at least the same reasons, their respective dependent claims are neither

anticipated by nor made obvious by the '987 patent and request withdrawal of the rejections under 35 U.S.C. §§ 102 and 103.

**Rejections Under 35 U.S.C. § 102(e)**

In the Office Action, the Examiner made numerous rejections under 35 U.S.C. § 102(e) and 103, as detailed below. Specifically, the Examiner rejected claims 1-15, 18-33, 36-39, 42, and 43 under 35 U.S.C. § 102(e) as anticipated by McDaniel et al., U.S. Patent No. 6,548,441 (hereinafter "the '441 patent"). The Examiner also rejected claims 1-15, 19-33, 37-39, 42, 43, and 46-48 under 35 U.S.C. § 102(e) as being anticipated by Hawley et al., U.S. Patent No. 6,573,344 (hereinafter "the '344 patent"). The Examiner rejected claims 1-15, 19-33, 37-39, 42, 43, and 46-48 under 35 U.S.C. § 102(e) as being anticipated by the '274 patent. Further, the Examiner rejected claims 1-11, 14, 15, 18-29, 32, 33, 36-39, 42, 43, and 46-48 under 35 U.S.C. § 102(e) as being anticipated by Thorn et al., U.S. Publication No. 2005/0113243 (hereinafter "the '243 application"). Finally, the Examiner rejected claims 1-15, 18-33, 36-39, 42, 43, and 46-48 under 35 U.S.C. § 102(e) as being anticipated by the '617 patent.

***The '441 patent and the '243 application do not disclose solid oxides that are "substantially free of titanium, molybdenum, zirconium, chromium, and tungsten."***

In rejecting independent claims 1, 20, and 38 as anticipated by the '441 patent under 35 U.S.C. 102(e), the Examiner stated that "[s]ince the process disclosed in McDaniel *et al.* is substantially the same as that recited in the instant claims, it is held that the resulting polymer exhibits the claimed properties." Office Action, p. 7. Similarly, in rejecting independent claims 1, 20, 38, and 46-48 as anticipated by the '243 application under 35 U.S.C. 102(e), the Examiner also stated that the "[s]ince the process disclosed in Thorn *et al.* is substantially the same as that recited in the instant claims, it is held that the resulting polymer exhibits the claimed properties." Office Action, pp. 9-10. Applicants respectfully traverse these rejections.

Independent claims 1, 20, and 38 recite “wherein the at least one chemically-treated solid oxide is substantially free of titanium, molybdenum, zirconium, chromium, and tungsten.” In contrast, the ‘441 patent and the ‘243 application do not disclose that the solid oxide support is free of these metals. The ‘441 patent does disclose that nickel is present in the support, but provides no disclosure that the other metals recited in the present claims are not present. The ‘441 patent, col. 10, l. 65-col. 11, l. 2. Further, the ‘243 application lists all of the recited metals, but provides no indication that any of these metals are excluded. The ‘243 application, paras. [0128]-[0129]. As previously noted, the prior art reference also must show the *identical* invention “*in as complete detail as contained in the ... claim*” to support a *prima facie* case of anticipation. *Richardson v. Suzuki Motor Co.*, 9 U.S.P.Q. 2d at 1920.

Therefore, the ‘441 patent does anticipate independent claims 1, 20, and 38, or, for at least the same reasons, their respective dependent claims. Similarly, the ‘243 application does anticipate independent claims 1, 20, 38, and 46-48, or, for at least the same reasons, their respective dependent claims. Accordingly, Applicants respectfully request withdrawal of the rejections under 35 U.S.C. § 102(e).

***The ‘344 patent does not disclose forming an ethylene-based copolymer.***

In rejecting independent claims 1, 20, 38, and 46-48 as anticipated by the ‘344 patent under 35 U.S.C. 102(e), the Examiner stated that the “[c]atalysts are used to prepare copolymer of propylene and ethylene.” Office action, p. 8. Applicants respectfully traverse the rejection.

Independent claims 1, 20, 46, and 47 recite “contacting ethylene and at least one olefin comonomer with a catalyst composition under polymerization conditions to form a copolymer.” Further, independent claims 38 and 48 recite “wherein the composition will form a copolymer when contacted with ethylene and at least one olefin comonomer.” Based on the present specification, one of ordinary skill in the art at the time of filing would understand the recitations of the instant claims to indicate an ethylene-based copolymer. *See, e.g.*, Specification, p. 47, ll.

23-25; *see also Phillips*, 75 U.S.P.Q.2d at 1328 (holding that the specification is “the primary basis for construing the claims”).

In contrast, the ‘344 patent discloses forming a copolymer of propylene and ethylene, wherein propylene is the primary monomer. The amount of ethylene introduced into the polymerization zone is less than “1200 ppm per million parts of liquid propylene.” The ‘344 patent, col. 12, ll. 55-56. This clearly describes a propylene-based copolymer, which is not the recited copolymer and which also would not have the same properties as the recited copolymer.

Nevertheless, while Applicants disagree with the Examiner’s interpretation of the claims and the analysis in the rejection, in an effort to advance prosecution Applicants have amended independent claims 1, 20, 38, and 46-48 to clarify that the recited copolymers are ethylene based copolymers. These amendments are supported by the specification, which notes that the maximum content of comonomer in the copolymer is less than or equal to about 10 wt. %. Specification, p. 47, l. 23-p. 48, l. 2.

Further, independent claims 1, 20, 38, and 46-48 all recite “wherein the at least one chemically-treated solid oxide is substantially free of titanium, molybdenum, zirconium, chromium, and tungsten.” In contrast, the ‘344 patent disclose that the solid oxide support may contain these metals. The ‘344 patent col. 8, ll. 39-41. However, the ‘344 patent provides no indication that the solid oxide is free of these metals.

Therefore, for the reasons discussed above, the ‘344 patent does not anticipate independent claims 1, 20, 38, and 46-48, or, for at least the same reasons, their respective dependent claims. Accordingly, Applicants respectfully request withdrawal of the rejections under 35 U.S.C. § 102(e), and allowance of the claims and their respective dependent claims.

***The present application claims priority to the '274 patent and the '617 patent.***

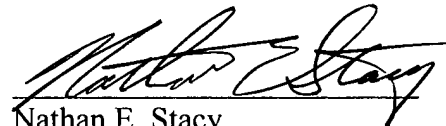
As previously mentioned, the Examiner rejected claims 1-15, 19-33, 37-39, 42, 43, and 46-48 under 35 U.S.C. § 102(e) as being anticipated by the '274 patent. Furthermore, the Examiner rejected claims 1-15, 18-33, 36-39, 42, 43, and 46-48 under 35 U.S.C. § 102(e) as being anticipated by the '617 patent. However, in view of the amendment to the instant specification to claim priority to these references, the rejections under section 102(e) based on these references are believed to be moot. Accordingly, Applicants respectfully request the Examiner withdraw the rejections under 35 U.S.C. § 102(e), and allow the present claims to issue.

**Conclusion**

In view of the remarks set forth above, Applicants respectfully request allowance of the pending claims. If the Examiner believes that a telephonic interview will help speed this application toward issuance, the Examiner is invited to contact the undersigned at the telephone number listed below.

Respectfully submitted,

Date: June 25, 2008

A handwritten signature in black ink, appearing to read "Nathan E. Stacy", written over a horizontal line.

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